

THE CLAIMS

What is claimed is:

1. A food product dispenser, comprising:

a fluid source;

a fluid nozzle;

5 a flowable food component source;

a food component nozzle; and

a delivery device connecting the fluid source to the fluid nozzle and the component source to the component nozzle for delivering a fluid and a food component from the respective source to the respective nozzle, wherein the delivery device and nozzles are

10 configured such that the fluid and component are ejected from the fluid and component nozzles, respectively, in fluid and component streams, respectively, which intersect each other at an intersection location at which at least one of the streams is substantially in a state of free fall;

wherein the delivery device and nozzles are configured for ejecting the streams

15 in a configuration such that the streams mix by collision to produce a food product which is directed to a dispensing location.

2. The dispenser of claim 1, wherein both the fluid and component streams are substantially in a state of free fall after the intersection location.

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3. The dispenser of claim 1, wherein the streams at the intersection location are unsupported by any solid structure and mix prior to filling a container.

25 4. The dispenser of claim 1, wherein the fluid stream is a jet, and the streams have reduced speeds downstream of the intersection location.

30 5. The dispenser of claim 1, further comprising a dispensing bay configured for receiving a container at the dispensing location for receiving the food product therein.

6. The dispenser of claim 1, wherein the food product is a beverage.

35 7. The dispenser of claim 1, wherein the fluid is water and the component is a liquid beverage concentrate.

8. The dispenser of claim 1, wherein the fluid nozzle comprises at least two fluid nozzles, and the fluid stream comprises at least two fluid streams that intersect at the intersection location.

5 9. The dispenser of claim 8, wherein the nozzles comprise ejection orifices, with the ejection orifices of the component nozzles being disposed closer than the ejection orifices of the fluid nozzles to a common central axis of the streams that extends through the intersection location.

10 10. The dispenser of claim 9, wherein the central axis is substantially vertical.

11. The dispenser of claim 9, wherein the component nozzle is configured for directing the component stream substantially along the central axis.

15 12. The dispenser of claim 8, wherein the first and second streams exiting the orifices form an angle of between about 20 and 60 degrees.

13. The dispenser of claim 12, wherein the streams delivered through each 20 fluid nozzle orifice has a flow rate of between about 5 and 25 ml/s and a linear velocity of between about 10 and 2000 cm/s, and the component is a liquid concentrate having a viscosity between about 1 and 5000 cP.

14. The dispenser of claim 13, wherein the streams delivered through each 25 fluid nozzle orifice has a flow rate of between about 7 and 15 ml/s and a linear velocity of between about 650 and 1250 cm/s, and the component is a liquid concentrate having a viscosity between about 300 and 1500 cP.

15. The dispenser of claim 8, wherein the fluid nozzle orifice has a 30 diameter of between about 0.5 to 1.5 mm, and the component nozzle has a diameter of between about 1 and 3.5 mm.

16. The dispenser of claim 8, wherein the fluid nozzles are spaced from the intersection location at a distance of between about 1 and 200 mm.

35 17. The dispenser of claim 1, wherein the delivery device comprises: a fluid pump configured for pumping the fluid from the fluid source to the fluid nozzle at a sufficient flow rate for producing the fluid stream; and

a component pump configured for pumping the component from the component source to the component nozzle at a sufficient flow rate for producing the component stream.

5 18. The dispenser of claim 17, wherein at least one of the pumps is configured to deliver pulses of the fluid or component.

19. The dispenser of claim 18, wherein the pumps are peristaltic pumps.

10 20. The dispenser of claim 17, further comprising a controller associated with the pumps for controlling the flow rates.

15 21. The dispenser of claim 1, wherein:

the component source comprises a plurality of component sources;

15 the component nozzle comprises a plurality of component nozzles for

dispensing different components from the component sources to the intersection location; and

20 the delivery device is configured for selectively activating and deactivating the flow from the component nozzles for dispensing a selected combination of one or more of the components to the intersection location depending on the type of food product selected for dispensing.

25 22. The dispenser of claim 21, further comprising a controller configured for controlling the delivery device for sequentially dispensing the components to the intersection location.

25 23. The dispenser of claim 21, further comprising a controller configured for controlling the delivery device for substantially simultaneously dispensing the components to the intersection location.

30 24. The dispenser of claim 1, further comprising a thermal exchange unit configured for heating or cooling the fluid to be dispensed.

35 25. A method of preparing a food product, comprising directing streams of a fluid and a food component from a dispenser towards an intersection location substantially immediately after which the streams are substantially in a state of free fall, such that the streams mix by collision and fall into a container to prepare a food product therein.

26. The method of claim 25, wherein the velocity of the streams is reduced downstream of the intersection location.

27. The method of claim 25, wherein the fluid stream comprises a plurality of fluid jets directed toward the intersection location.

5 28. The method of claim 27, wherein the component stream comprises a plurality of component streams directed toward the intersection location, the component streams comprising different components.

10 29. The method of claim 28, which further comprises:
 entering into the dispenser a selection of a type of food product to be dispensed; and

15 selectively activating and deactivating the different component streams for dispensing a selected combination of one or more of the components to the intersection location depending on the type of food product selected.

15 30. The method of claim 28, wherein the different components in the combination are dispensed sequentially.

20 31. The method of claim 28, wherein the different components are dispensed substantially simultaneously.

25 32. The method of claim 25, wherein the streams are ejected from the dispenser at an angle with respect to each other of between about 1 to 180 degrees, preferably between 20 and 60 degrees, and most preferably between 25 to 35 degrees.

30 33. The method of claim 25, wherein the flow rate of the fluid streams have a flow rate of between about 5 and 25 ml/s and a linear velocity of between about 10 and 2000 cm/s, and the component is a liquid concentrate having a viscosity between about 1 and 5000 cP.

35 34. The dispenser of claim 33, wherein the streams delivered through each fluid nozzle orifice has a flow rate of between about 7 and 15 ml/s and a linear velocity of between about 650 and 1250 cm/s, and the component is a liquid concentrate having a viscosity between about 300 and 1500 cP.

35 35. The method of claim 25, wherein the food product is a beverage.